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writers find the single word *type*—understood the world over—sufficient for ordinary needs. But in cases where a species rests on more than one specimen, and the author neglected to indicate a type, the term *cotype* is used to designate each of the several specimens on which the original description was based. Still another term is found convenient and is in common use among mammalogists. It is the word *topotype*, proposed by Mr. Oldfield Thomas, and used to designate a specimen from the identical locality from which the type specimen of a species came. Among plants and non-migratory terrestrial animals, *topotypes* are, after the original types, the most valuable study material a museum can possess.

In paleontology, where it is customary to describe new species from very fragmentary material—such as the tooth of a mammal or the leaf of a plant—which is afterwards supplemented by the discovery of additional parts, it becomes convenient, as pointed out by Mr. Schuchert, to consider the later and more perfect specimens, from which additional characters are derived, as *supplementary types*. This, however, hardly seems sufficient provocation for the introduction of a special set of new terms. Nevertheless, if paleontologists really feel the need of these terms I suppose the rest of us should try to bear them with becoming fortitude; but would it be too much to ask that they be considered as proprietary material and not let loose on the whole field of systematic biology?

It is pleasing to note that Mr. Schuchert is a firm believer in the priceless value of type specimens and that he advocates the use of special colored labels to distinguish them from others. Fortunately the use of such labels for this purpose is rapidly becoming general. It might be added that as a rule type specimens should not be placed in the exhibition series in public museums, but should be carefully preserved in special cases devoted exclusively to such material. The exhibition in glass cases of type specimens of animals injured by light—as birds and mammals—indicates a disinterestedness amounting almost to criminal neglect.

While discussing the matter of types I would like to digress sufficiently to express the con-

viction now shared by a large body of working naturalists that type specimens, being units of comparison, should from the nature of the case be single, not multiple. It is the common experience of naturalists that in a considerable percentage of the cases where several specimens have been used as types, subsequent study has shown these specimens to belong to different species, and in some cases to different genera. Is not this fact alone an unanswerable objection to the existence of more than one type specimen of a species?

C. HART MERRIAM.

SCIENTIFIC LITERATURE.

Spencer's Principles of Sociology. New York, D. Appleton & Co. 1897. Volume III., pp. x + 645.

This volume completes not only Mr. Spencer's great work on 'The Principles of Sociology,' which in itself is an undertaking quite sufficient to establish the permanent reputation of any one man; but also the system of 'Synthetic Philosophy,' which was begun more than thirty-six years ago, and has been carried forward under circumstances of extraordinary difficulty. The system as it now stands in its final form includes the volume entitled 'First Principles,' in which the general doctrine of evolution is formulated in abstract terms; two volumes on 'The Principles of Biology,' two on 'The Principles of Psychology,' three on 'The Principles of Sociology' and two on 'The Principles of Ethics.'

No other mind in our generation has attempted to grapple so seriously with so many great subjects as Mr. Spencer has done; no other one thinker has so impressed himself upon all serious investigators in each of the great branches of scientific knowledge. Very few professional biologists are more frequently quoted than Mr. Spencer in works on biology; few, if any, professional psychologists are so frequently quoted in works on psychology; few, if any, professional writers on ethics are so frequently quoted in discussions of morals. This one fact is a significant index of Mr. Spencer's range and power. Even if it be true that the expert in each of the sciences mentioned disagrees with Mr. Spencer's conclusions on vital points, it is an astonishing achieve-

ment for any one man to have so impressed himself upon the best thought in so many fields of mental activity that all whose life work is concerned with these subjects find it necessary to define their relations to one such comprehensive thinker.

Of Mr. Spencer's 'Principles of Sociology' it must be said, first, that it should not be judged with reference to any conclusion that the critic may have reached upon the question whether or not there is a science of society. The phenomena of society are the most complex and perhaps the most elusive with which a serious student can deal. It may be that scientific opinion will presently be practically unanimous that no laws of social causation can be formulated which can be placed in the same category with those laws that make up the physical sciences. It will not follow, however, that society cannot be studied in a scientific spirit and by scientific methods. Whether or not, then, Mr. Spencer has created a science of sociology, he has at least demonstrated that social phenomena can be studied with scientific seriousness, and that if we do not thereby establish positive laws of social causation we shall, at least, attain to broader and truer views of social organization, of our personal relations to our fellow men and of the expediency of various schemes of governmental policy.

Of the wealth of illustration, the enormous array of facts which Mr. Spencer has brought together in these volumes, it is desirable to say that they have been made the subject of some unjust criticism. It is true that Mr. Spencer has depended upon the reports of travelers, explorers and missionaries for the greater part of his material; it is true that the observations so obtained have not always been made with critical discernment; but, on the other hand, it is to be remembered that comparatively little work has ever been done in sociological observation by trained observers. The test, therefore, that should be applied to Mr. Spencer's data is the question: "Has he on the whole made a discriminating and critical use of such material as was available?" When judged by this standard, Mr. Spencer's work in sociology will be found to be above the average level of treatises on anthropology and ethnology.

It is not necessary to speak in detail of Mr. Spencer's analysis of social organization or of his interpretation of social progress, as these things have become already familiar to the general reader. The organization of society, like that of the plant or of the animal, becomes complex through differentiations of activities and of groupings; it becomes unified through the integration of small communities into great nations. Social change, on the whole, is a progress from homogeneity to heterogeneity, in both activity and organization. Another point, however, and the one which is really vital in Mr. Spencer's philosophy of human relations, may be emphasized, because it is too often overlooked. Mr. Spencer does not admit that human nature is unchanging. Character, like everything else, undergoes a progressive modification. The environment and circumstances of a community are the environment of the individual character. Under conditions favoring industry and peace human nature develops the virtues of gentleness, truthfulness and industry; under conditions necessitating prolonged or chronic warfare human nature becomes cruel, tyrannical or subservient, untruthful, all that is vicious. This contention is maintained in all of Mr. Spencer's sociological writings, and is the chief proposition of 'The Principles of Sociology,' recurring again and again in the successive parts on Domestic, Ceremonial, Political, Ecclesiastical, Professional and Industrial Institutions.

Mr. Spencer's final conclusions, as he surveys the civilized world at the present moment, are somewhat despondent. He sees everywhere the revival of the military spirit and he looks for a marked deterioration of individual and national character in the immediate future. Of the more distant future, however, he expects better things, and at the conclusion of his work he renews the prediction which he made nearly fifty years ago: "The ultimate man will be one whose private requirements coincide with public ones. He will be that manner of man who, in spontaneously fulfilling his own nature, incidentally performs the functions of a social unit, and yet is only enabled so to fulfil his own nature by all others doing the like."

FRANKLIN H. GIDDINGS.